

**INSPECTION REPORT**

Confidential Claim Retracted

Authorized by: SC

Date: 6/24/13

**Jackpile-Paguate Mining Operations  
The Anaconda Company  
Jackpile Mining Lease  
and  
Laguna Mining Lease No. 4  
Laguna Indian Reservation  
Valencia County, New Mexico**

**U. S. Geological Survey  
Conservation Division  
Area Mining Supervisor  
Southern Rocky Mountain Area  
P. O. Box 1716  
Carlsbad, New Mexico 88220**

**Dale C. Jones  
Mining Engineer  
March 10, 1977**



**9404499**

**CONFIDENTIAL**

**POL-EPA01-0006650**

The Anaconda Company's Jackpile-Paguate uranium mining operations, both open-pit and underground, were examined February 15, 1977. The writer was accompanied on the inspection tours by Bill Clark of the USGS and Clifford Gibbs, John Nelson, and Greg Kasza of the company's underground operations section.

The mining operations are located within the Jackpile Mining Lease and Mining Lease No. 4 which were issued to The Anaconda Company by the Pueblo of Laguna May 7, 1952, and July 30, 1963, respectively. These leases occupy about 7,550 acres of the Laguna Indian Reservation, in Townships 10 and 11 North, Range 5 West, NMPM, near Paguate in Valencia County, New Mexico. The Pueblo of Laguna owns all of the surface and mineral rights involved and also administers the leases in conjunction with the BIA and the USGS.

The Jackpile-Paguate Pit is actually two adjacent open-pits, and the Paguate Pit is further designated the North and South Paguate Pits. The easternmost Jackpile Pit has produced uranium ore since discovery of the ore deposit in 1952 while the Paguate Pit has yielded ore since 1963. The North Paguate Pit has now been mined out, but the South Pit is still producing with new overburden stripping underway on its west end. Operations are conducted three shifts per day, 7 days per week resulting in the production of 4000+ tons per day (TPD), although this rate can vary significantly from day to day. In the Jackpile Pit, some overburden stripping is performed by Hamilton Construction, a private contractor, but Anaconda takes over the mining activities once the top of the ore bearing formation is encountered.

In the open-pits, the host rock for the uranium ore is the Jackpile Sandstone unit, a coarse grained arkosic sandstone which is the uppermost extent of the Brushy Basin Member of the Jurassic Morrison Formation. The Jackpile ranges from 50 to 200 feet in thickness in the mining areas and contains ore from 1 to 15 feet thick an an average depth of 135 feet. Generally, the ore in the Jackpile Pit is thicker and more uniform than that in the Paguate Pit. The grade of the ore ranges from about 0.02% to as much as 0.50%  $U_3O_8$  in some areas.

Solid overburden is removed to the top of the Jackpile Sandstone by conventional drilling and blasting and subsequent loading into haulage trucks. Ingersoll-Rand, Chicago Pneumatic and Gardner-Senver rotary drill rigs bore 6 3/4-inch holes which are loaded primarily with ANFO (ammonium nitrate-fuel oil) for blasting. The number and pattern of the blast holes vary, depending on overburden characteristics, as does the addition of other blasting agents such as ANFO boosters and stick powder. Loading of the overburden is accomplished by such equipment as Caterpillar (Cat) D-9 bulldozers; Dart 600 (15-cubic yard capacity bucket) and Cat 992 (10-cubic yard capacity bucket) front-

end loaders; and Euclid R-20 and R-50 (23- and 50-ton capacities respectively) haulage trucks. This type of procedure is also used to extract barren portions of the Jackpile Sandstone, and both overburden and Jackpile waste rock are transported to the mine waste dumps or used to backfill mined-out areas in the pits. The pit benches vary considerably in width and average about 35 feet in height.

Original exploration drilling for the open-pit ore was conducted on 50-foot centers. Once the stripping of overburden reaches the top of the Jackpile, the ore is further defined by development drilling on 25-foot centers. These 4 3/4-inch diameter development holes are drilled by truck-mounted, rotary drill rigs and are then probed at 2-foot intervals using an Eberline Geiger counter probe.

Once the development drilling has been completed, mining of the ore begins by ripping the bench surface with Cat D-9 bulldozers. The loosened muck is then probed to a depth of about 18 - 24 inches by a man using a "T" probe which counts gamma ray emissions for a set amount of time in counts per second (cps). Ore zones are determined by the probe readings and are marked accordingly on the surface with stakes and flags. Generally, the ore is removed first by D-9, Dart 600, Cat 992, and R-20 equipment although waste material sometimes must be removed first. This procedure is repeated as benching continued.

After the haulage trucks have been loaded with ore, they proceed directly to one of various scanners located in the pits. The scanner is a scintillation device that counts gamma ray emissions from the ore for 30 seconds, and the results are given to the scanner operator in cps. This cps reading is recorded and determines which stockpile the truck will proceed to.

Ore from both the open-pit and underground workings is stockpiled at various locations in the open-pits according to its mining area and grade. Open-pit and underground ore are stockpiled separately due to metallurgical characteristics, accounting purposes, and to avoid long haulage distances. According to Anaconda officials, there are several stockpiles that contain material with an average grade as low as 0.02-0.05%  $U_3O_8$ ; and, due to <sup>the</sup> increased price of uranium, some waste dumps have been drilled to re-evaluate their ore content.

From the various stockpiles, a separate fleet of loading and haulage equipment transfers the ore to the Atchinson, Topeka and Santa Fe (ATSF) railhead which is located south of the Jackpile Pit. Here the ore is crushed prior to being loaded by conveyor belt into 100-ton railroad cars. The conveyor belt is equipped with a weightometer so that the cars can be loaded as close to 100 tons as possible because Anaconda must pay a penalty to ATSF if the cars contain more than this amount. The conveyor is also equipped with a scanner very

similar to those in the pits so that the grade of the material loaded into the cars can be determined. Both the weight and grade of the ore loaded into each railroad car is recorded. Once loaded, the ore is then transported to the company's acid-leach mill in Bluewater about 8 miles west of Grants, New Mexico. Anaconda plans to expand the capacity of the mill from 2500 to 6000 tons per day as about 1000 tons per day of the open-pit ore is currently being toll milled on an irregular basis at Sohio's facility about 5 miles north of the Jackpile Pit. Modification of the mill would also allow the processing of lower grade ore according to company officials.

At the mill, the ore is sampled and assayed, and royalty payments are determined using the  $U_3O_8$  assay. In the near future, the writer plans to tour the milling facility to examine these sampling and assaying procedures.

While touring the open-pit mining operations, the party also examined the area where the company's proposed PW2-PW3 Mine Project would be located. This project would be a scam type operation developed from an adit collared in the mined-out North Paguete Pit. The involved deposits contain an indicated 36,500 tons of ore with an average grade of about 0.27%  $U_3O_8$  and are located on the fringes of more concentrated ore zones which were extracted using open-pit methods. It is not feasible to open-pit mine the PW2-PW3 deposits due to their close proximity to State Highway 279 and the village of Paguete. A mining and reclamation plan for the PW2-PW3 Mine Project was submitted January 5, 1977, and an environmental analysis of the plan is being prepared.

Also examined during the open-pit tour were the locations of the portals for the P-9-2, P-9-3 and P-11 Adit Mine Projects. These portals are located near the bottom of the small, mined-out P-9-1 open-pit which is situated on the southeast margin of the Paguete Pit. The P-9-2 Project was approved in 1974, and mining was halted in October or November of 1976 pending further exploration work. The P-9-3 and P-11 Projects were approved in 1975 as a supplement to the plan for the P-9-2 Project, but mining has been delayed pending further evaluation of the use of open-pit methods to extract this ore. Anaconda now plans to use underground methods for the P-9-2 and P-11 ore zones and is currently pumping water from the adits.

The company's operating underground mine is called the P-10 Mine, but it actually consists of two connected mining areas, the P-10 and P-7. The mine operates three 8-hour shifts per day, 5 days per week, and has a total of about 165 employees including staff and maintenance personnel. Current ore production is about 1000 tons per day. Due to its water content, most of this ore is being toll milled at Kerr-McGee Corporation's mill in Ambrosia Lake near Grants.

From the surface, access to both mining areas is provided by a declined shaft (about 12%) approximately 2000 feet in length. The decline (about 9 feet by 16 feet) is supported by steel sets with tight timber lagging and contains a 24-inch conveyor belt that carries ore and waste to the surface. At the bottom of the decline is a 300-tons per hour jaw crusher and the mine pump station and sump. About 120 to 130 gallons per minute of water are pumped from the mine for about 7 hours per shift.

In the P-10 mining area, the ore zones range from about 200 to 400 feet in depth, and ore extraction is accomplished using a modified room-and-pillar method with sublevel track haulage. Conventional equipment such as jackleg drills and triple-drum slushers is utilized; and stulls, timber and/or steel sets, and rock bolts with wire mesh and/or landing mats are used for ground support. Access from the haulage level to the ore zones is provided by various man- and serviceways which are strategically located throughout the mine area. Ore development drifts are driven on 45-foot centers leaving pillars that measure approximately 43 feet square.

Pillar removal results in an extraction rate of about 90%, and in some areas about 95%. The ore is transferred from the stopes to the haulage level through various ore passes that are also strategically located throughout the mine area. Some of these ore passes have been driven by conventional methods, but the majority of them are drilled by a Caldwell Raise Bore in which case they are bored with 52-inch diameters and then case<sup>d</sup> to 48-inch diameters. From the ore passes, the ore is loaded into side-dump railroad cars (car factor of 3.7 tons) which are pulled by 8-ton diesel engines to a dump station that feeds the crusher at the bottom of the decline.

The P-7 area is about 1000 feet northwest of the P-10 area, and the ore zones range from about 170 to 450 feet in depth. The mining method used here is the same as in the P-10 area except that LHD (load-haul-dump) equipment is being used to move the ore to the ore passes. Access to the stopes for the LHD's is provided by a ramp driven on a 20 to 25% slope between the ore and haulage levels. Presently, only development work is being performed in the P-7 area, and the entire area will be totally developed before pillar extraction beings. The development drifts are driven on 50-foot centers resulting in pillars about 47 feet square, and ground support consists primarily of timber and/or steel sets and rock bolts and landing mats. Wire mesh is not used in the stop<sup>e</sup> areas to avoid entanglement with the buckets of the LHD's. Ore from the P-7 area is transported to the crusher dump by the same type of haulage equipment that is used in the P-10 area.

Once crushed, the ore and waste material from the P-7 and P-10 mining areas is carried separately up the decline to the surface by the 24-inch conveyor belt. On the surface, it is loaded into trucks and transported to the appropriate stockpile, dump or backfill area in the open-pits as previously discussed.

Ventilation of the P-10 and P-7 workings is accomplished by downcasting fresh air and exhausting contaminated air through various boreholes. These boreholes are drilled from the surface with 48-inch diameters, cased with steel tubing to 42-inch diameters, and equipped with electrically driven 60- to 100-horsepower axial-flow fans. Currently, about 250,000 cubic feet of air per minute are being used for ventilation.

Water from the P-7 and P-10 workings is collected in the sump at the bottom of the decline from where it is pumped to the surface. On the surface, this water is piped to a mined-out area of the Paguate Pit where it is impounded with water from the other open-pit and underground workings. The water is periodically withdrawn from this impoundment and applied to the various haulage and access roads for dust suppression.

Throughout the inspection tour of the open-pit and underground operations, no violations of lease terms were observed.

Dale C. Jones  
Mining Engineer

DCJ:cj

Original to: Superintendent, BIA, Southern Pueblos Agency  
cc: Governor, Pueblo of Laguna  
Chief, Branch of Mining Operations  
Through Regional Conservation Manager  
Area Mining Supervisor, SRMA  
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